

## Image Processing For Acousto-Optic Tunable Filter (AOTF) Hyperspectral Imaging Instrument

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AOTF is a high resolution, fast programmable bandpass filter, operating through the principle of optical diffraction at a moving index grating generated by an acoustic wave in an anisotropic medium. The diffraction generates two monochromatic beams with polarization directions orthogonal to each other. Therefore, this filter provides opportunities to develop instruments capable of taking images as functions of wavelength and polarization. This filter can be tuned in sequential, random, and multiwavelength access modes, providing observational flexibility to broaden the area of applications. Recently, we have successfully developed AOTF polarimetric hyperspectral imaging breadboard/prototype systems operating in the visible and infrared wavelength ranges and performed field experiments on natural and artificial objects. Results illustrate enhancing/enabling capabilities of this technology in remote sensing, and also reveal a need of a "real-time" multidimensional imaging processing in order to take the full advantage provided by AOTF. This paper will discuss image processing issues relevant to the use of AOTF instruments for remote sensing applications.